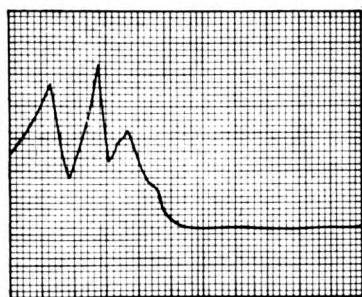




7. Decreases Fire Risk.

There is just one proper place for a lubricant and that is in the bearings. The lubricant that melts and drips ceases to serve a useful function and immediately becomes a menace. There are no oil-soaked floors or materials where Keystone Grease is used because of its unchanging density. There is no constant filling of grease-cups to replace wasted lubricant, because

Lowering and Stabilizing
the Cost Curve



This is No. 7 of 10 Dominant Factors in
Lowering and Stabilizing the Cost Curve:
—We have a Booklet—Send for it.

KEYSTONE GREASE

“The Master Lubricant”

does not melt and drip. Consequently there are no overheated bearings, which increase the fire hazard, waste the time of your engineers and oilers and shorten the life of your machinery. The responsibility for many bad fires is traced directly to this one cause. Be sure your lubricant contains no tallow, animal fat, cheap oils, or other ingredients that melt and run from the bearing surfaces.



Makes the most efficient mechanical unit more efficient

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Chicago
Detroit
St. Louis
Denver

Executive Office and Works

Philadelphia, Pa.

Established 1884

San Francisco
Minneapolis
Montgomery, W. Va.
Kansas City
Memphis
Omaha
Tulsa, Okla.

Agencies in Principal Countries Throughout the World

Co-operate:—Refer to The Blast Furnace and Steel Plant

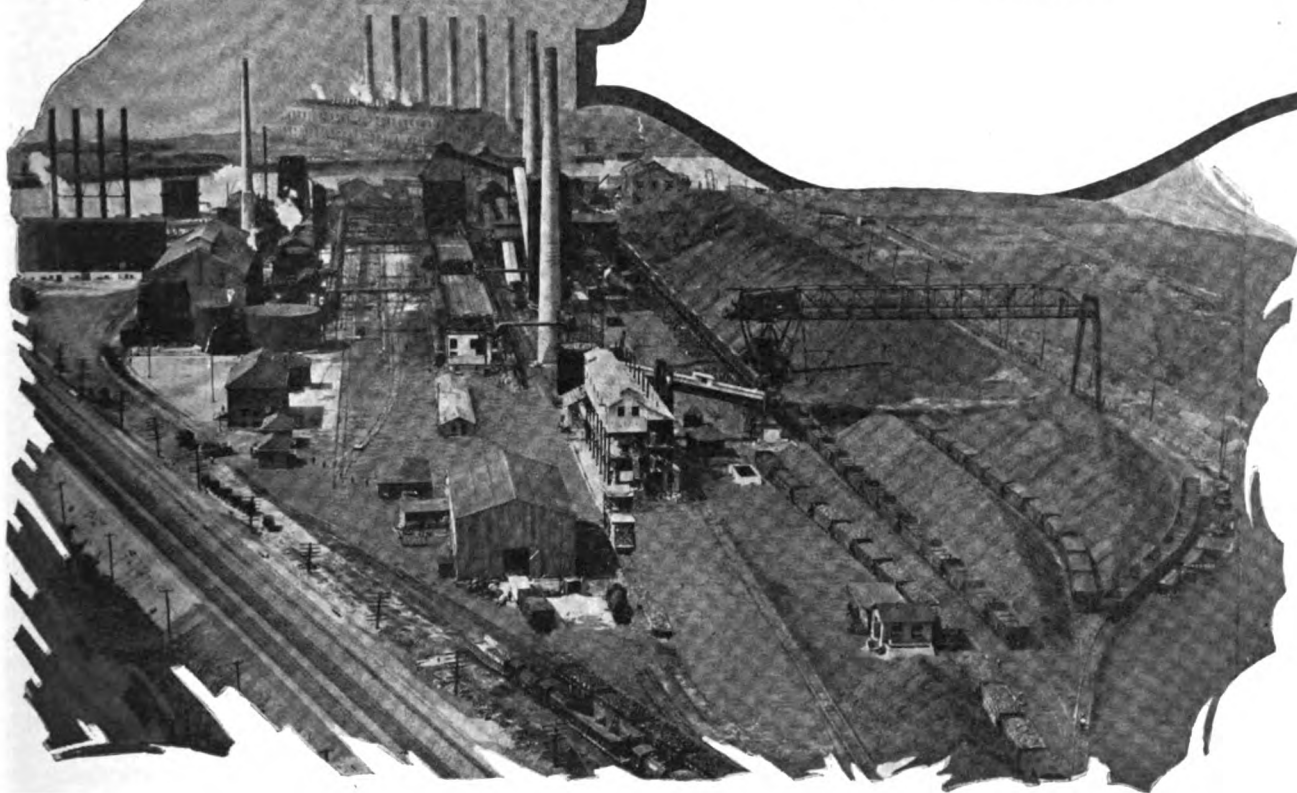
Aeroplane view of
Seaboard By-Product Coke Plant
at Kearney, N. J.

BY-PRODUCT COKE DEPARTMENT

By-Product Coking During the Past Year
By C. J. RAMSBURG

Dry Cooling Process of Coke
By DR. P. SCHLAPFER

The Carbonization of Coal with Blue Gas
and Producer Gas.
By W. REED MORRIS



The Blast Furnace Steel Plant

ANNUAL REVIEW &



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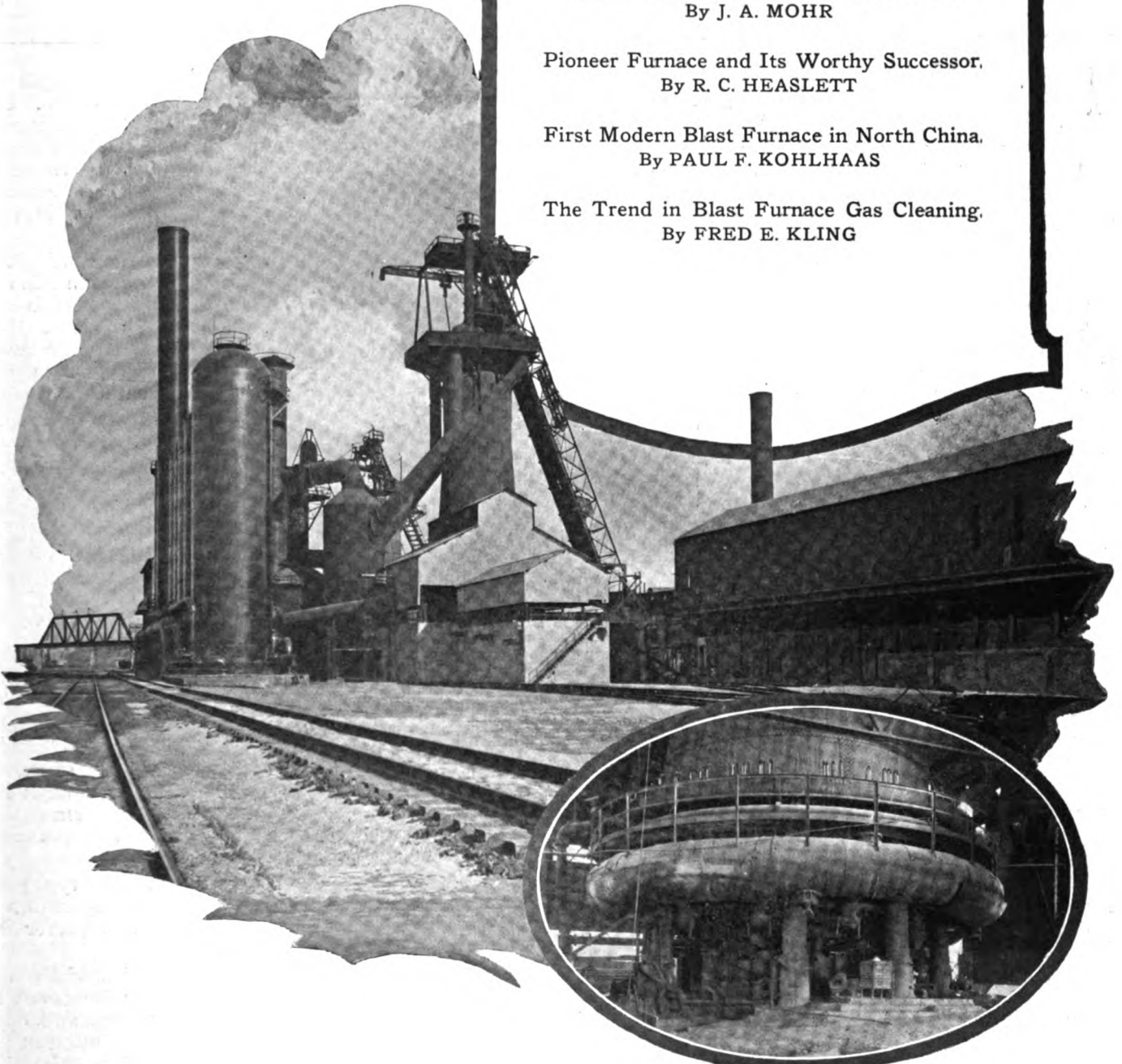
BLAST FURNACE DEPARTMENT

Blast Furnace Operations During the Year.
By J. A. MOHR

Pioneer Furnace and Its Worthy Successor.
By R. C. HEASLETT

First Modern Blast Furnace in North China.
By PAUL F. KOHLHAAS

The Trend in Blast Furnace Gas Cleaning.
By FRED E. KLING



The Blast Furnace *and* Steel Plant

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Open Hearth Furnaces
at the Plant of the
Weirton Steel Co., Weirton, W. Va.

STEEL WORKS DEPARTMENT

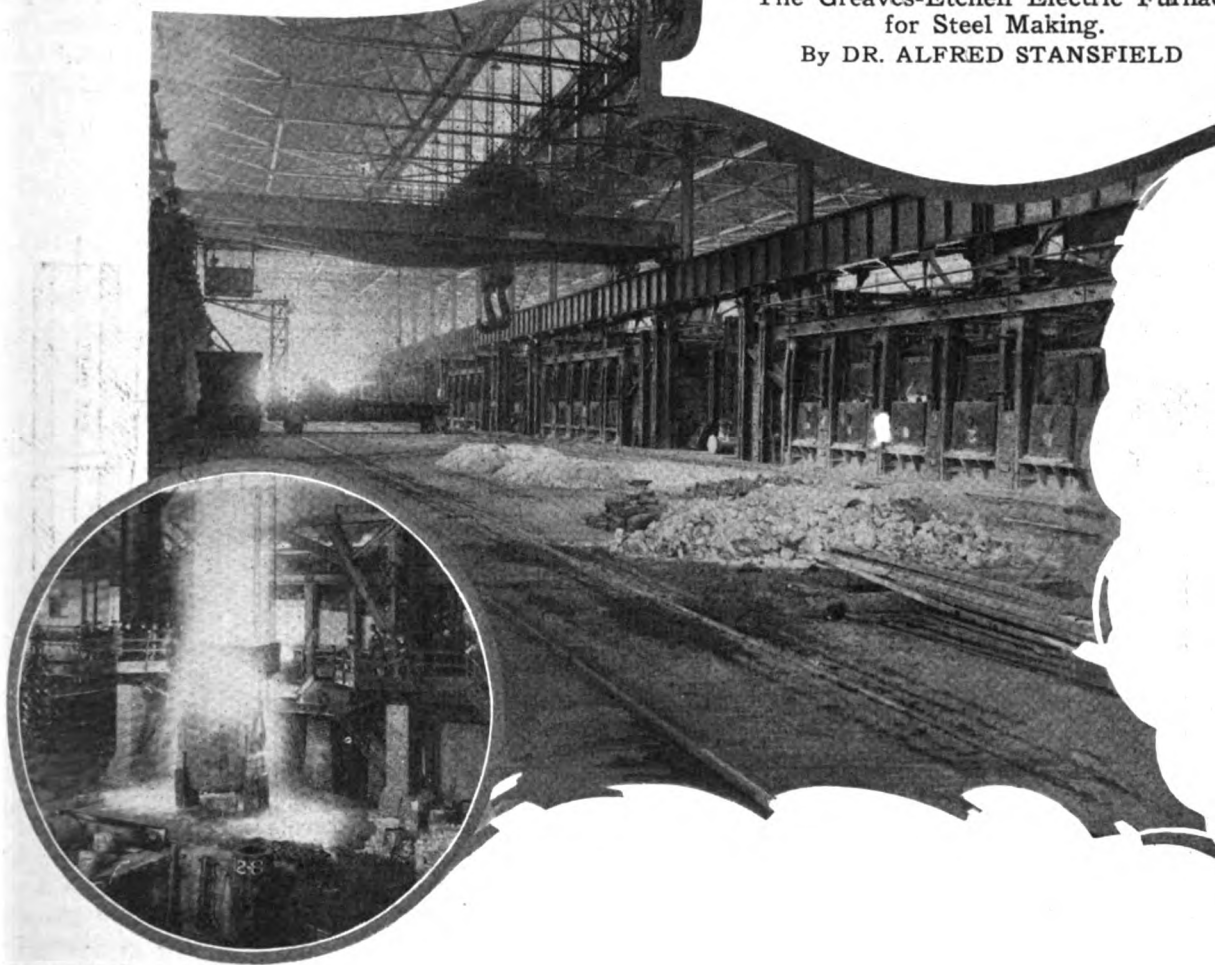
Developments in the Open Hearth
By HERBERT F. MILLER, JR.

Control of Sulphur in the Basic Open
Hearth Process.
By SYLVESTER V. WILLIAMS

Gas Producers and Producer Gas
By VICTOR WINDETT

Improvements in Open Hearth
Furnaces.
By E. C. COOK

The Greaves-Etchell Electric Furnace
for Steel Making.
By DR. ALFRED STANSFIELD



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ROLLING MILL DEPARTMENT

110-in. Plate Mill of the Tennessee Coal,
Iron and Railroad Co., Fairfield, Tenn.
The insert is an 18-in. motor driven
sheet bar mill at the Portsmouth Plant
of the Whitaker Glessner Co.

River Transportation Featured in
Ohio Steel Plant

By F. J. CROLIUS

Foreign Blooming Mill Practice

By DR. C. KIESSELBACH

Chilled Roll Making for Sheet Mills

By W. H. MELANEY

Recent Interesting Electrical
Developments

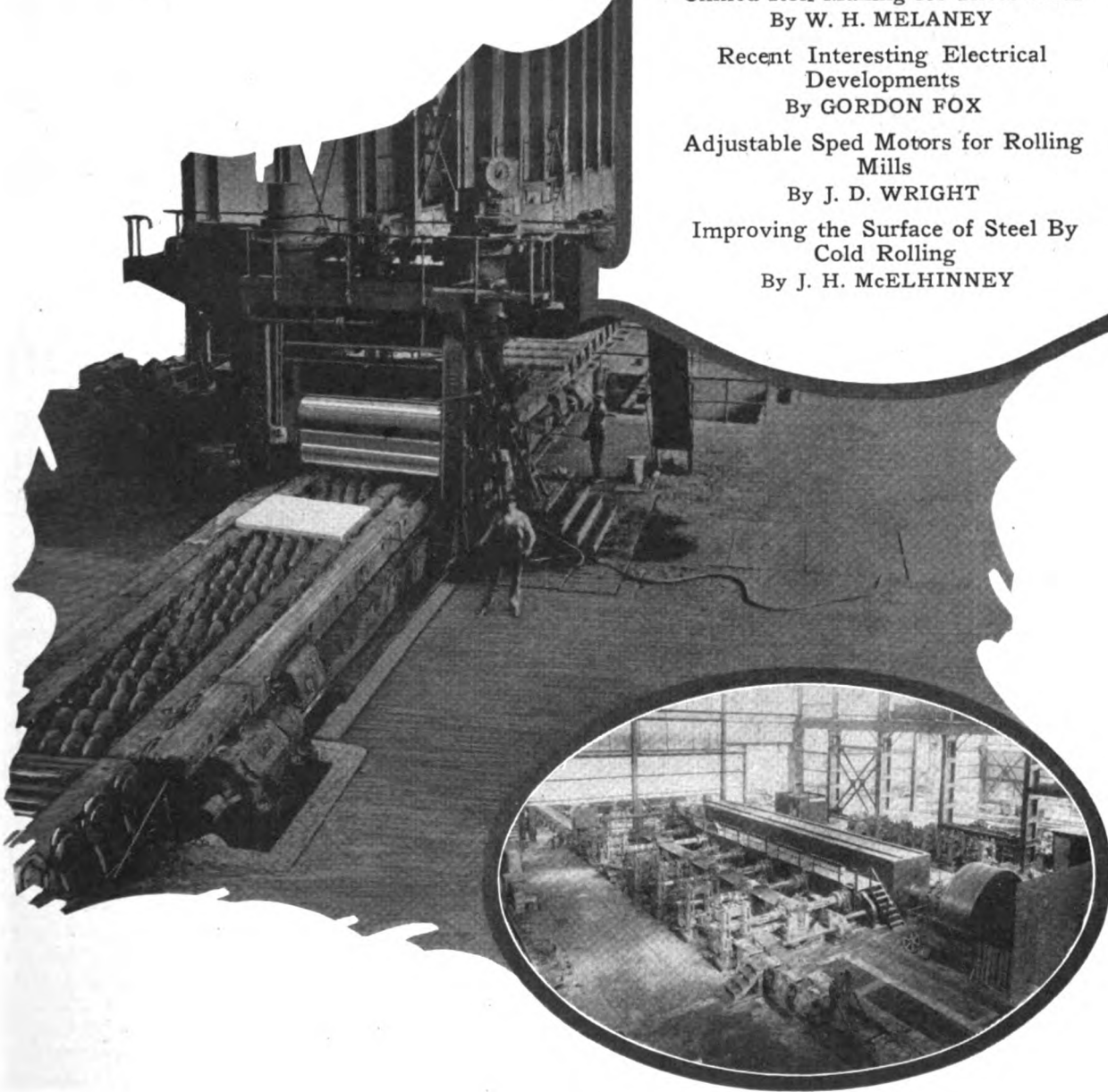
By GORDON FOX

Adjustable Sped Motors for Rolling
Mills

By J. D. WRIGHT

Improving the Surface of Steel By
Cold Rolling

By J. H. McELHINNEY



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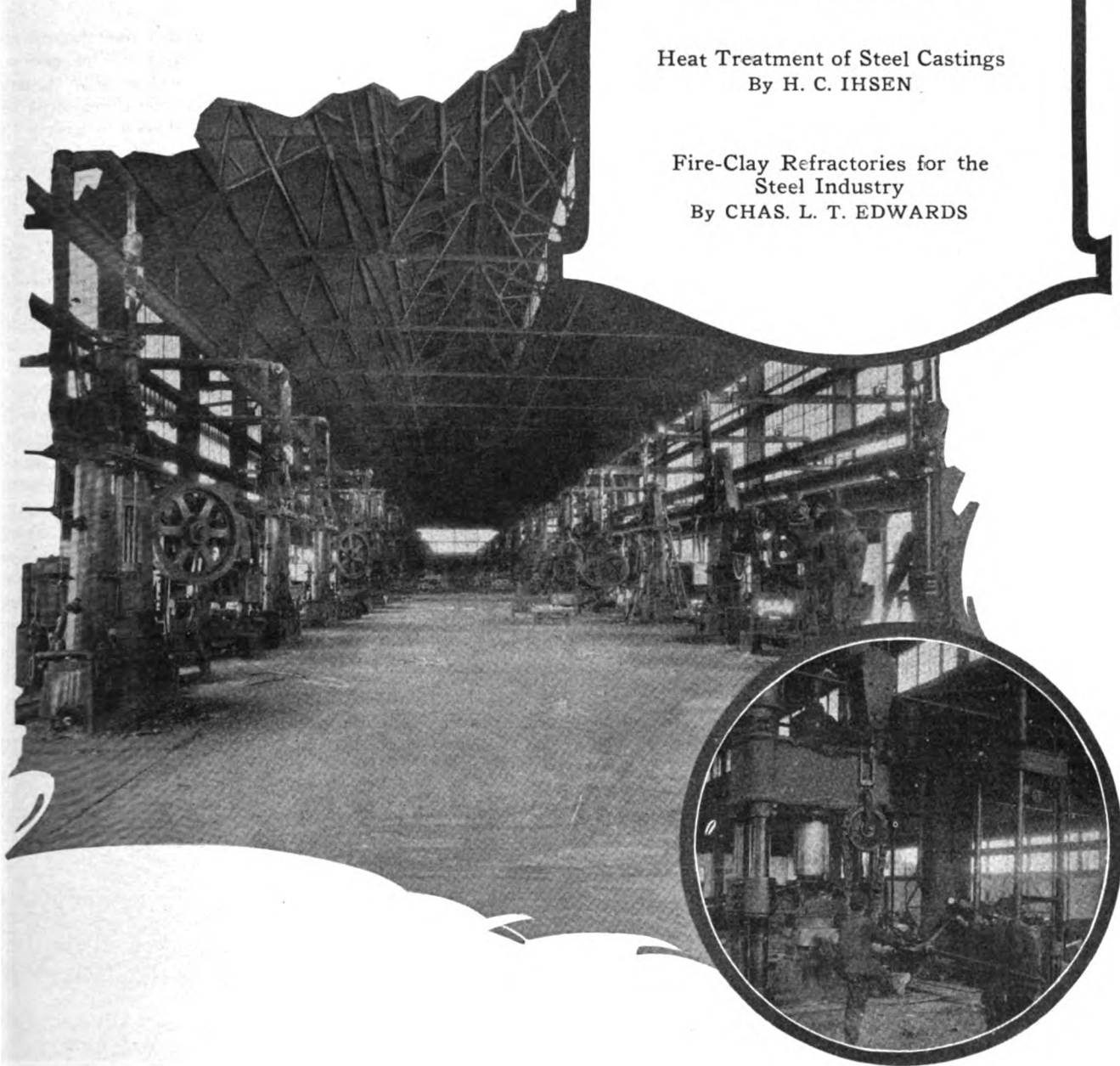
Forging Department of the
Chevrolet Motor Co., Detroit, Mich.
A Division of the
General Motors Corporation

FORGING AND HEAT TREATING DEPT.

World Economic Situation for 1923
By HERBERT HOOVER

Heat Treatment of Steel Castings
By H. C. IHSEN

Fire-Clay Refractories for the
Steel Industry
By CHAS. L. T. EDWARDS



The Blast Furnace *and* Steel Plant

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Power Plant of the
Ford Motor Co.
at River Rouge, Mich.

POWER DEPARTMENT

Power Progress During 1922

By FRED J. CROLIUS

Trend of Power Development as
Affecting Steel Mills

By BRYANT BANNISTER

Synchronous Motors

By E. FRIEDLANDER

The Value of Raising Steam
Temperatures

By JOHN R. LE VALLEY

The Selection of Boiler Feeders

By H. A. SCHULTZ

New Method of Determining Heat
Losses Due to Incomplete
Combustion in Furnaces.

By O. I. HOUSEY

Large Gas Engines Installed in
Steel Plants

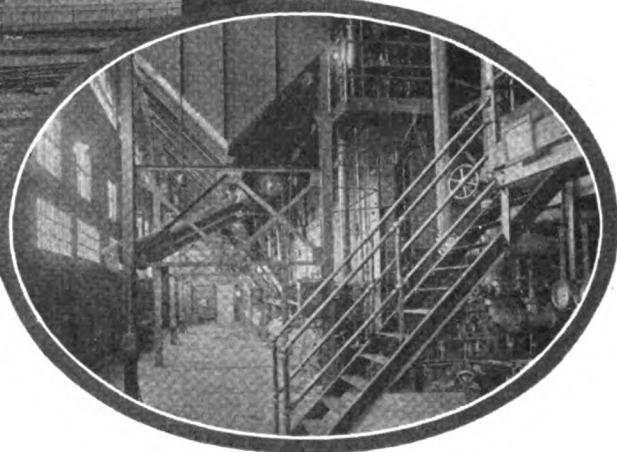
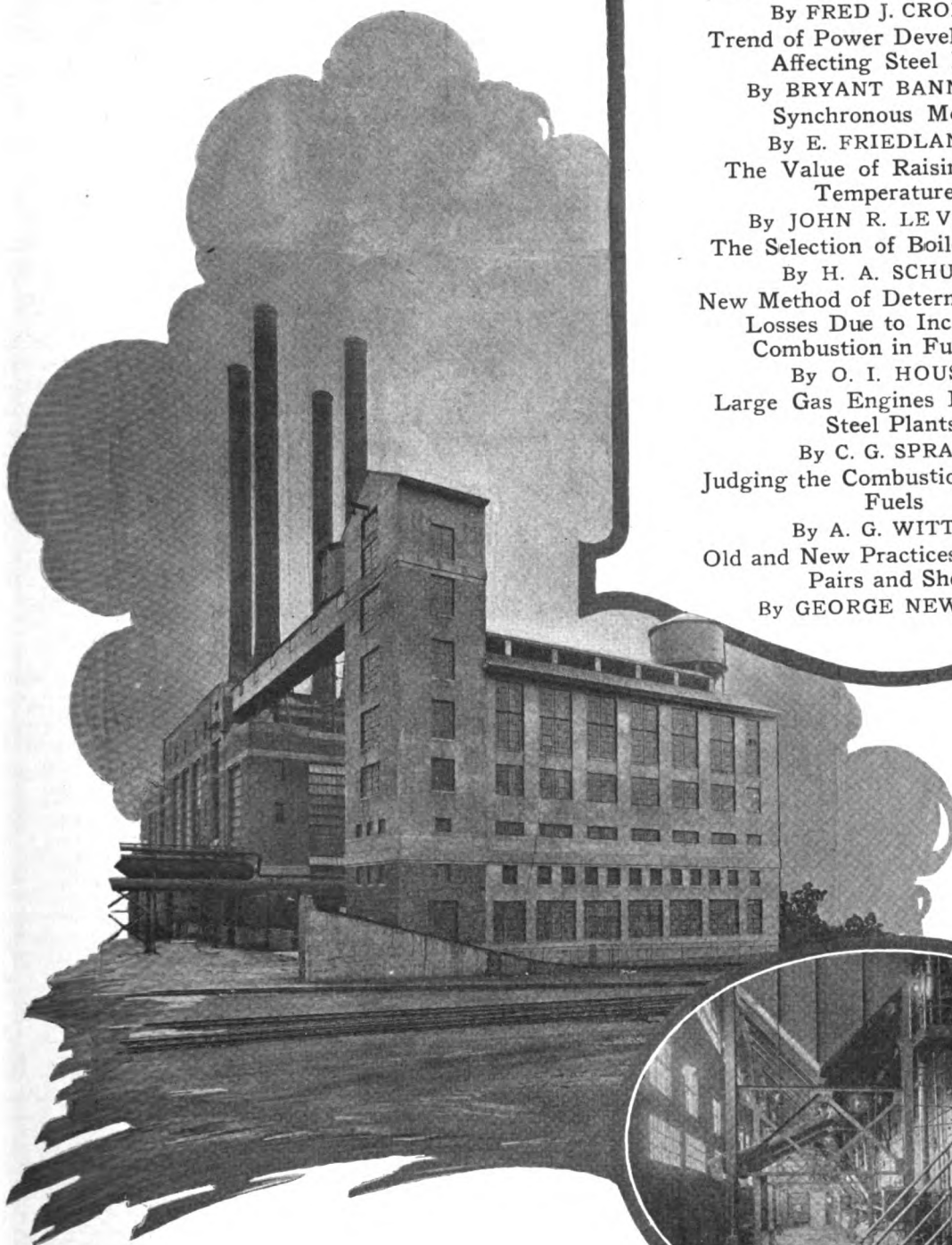
By C. G. SPRADO

Judging the Combustion of Liquid
Fuels

By A. G. WITTING

Old and New Practices in Heating
Pairs and Sheets

By GEORGE NEWHOUSE

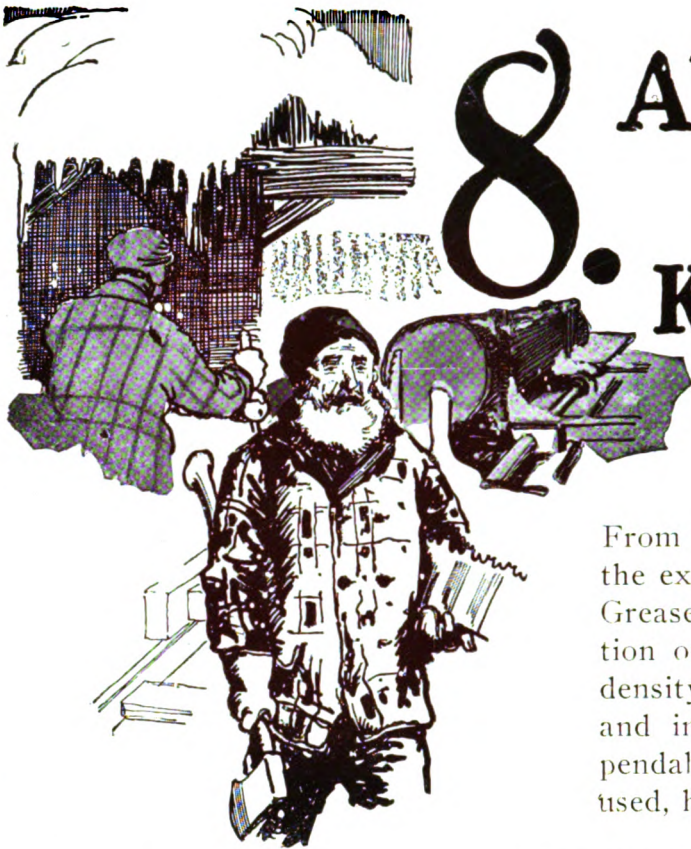


The Blast Furnace and Steel Plant

ANNUAL REVIEW &



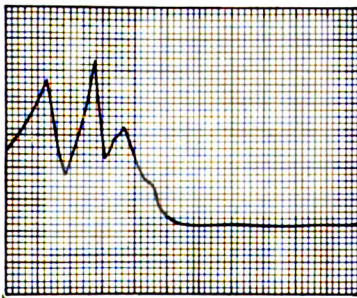
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8. All Temperatures are Alike to Keystone Grease

From the severe cold of the lumber camp to the extreme heat of rolling mills, Keystone Grease is found performing to the satisfaction of its users under all conditions. Its density remains the same in freezing blasts and in scorching sun. Its consistent, dependable, superior service wherever it is used, has built up for

Lowering and Stabilizing
the Cost Curve



*This is No. 8 of 10 Dominant Factors in
Lowering and Stabilizing the Cost Curve:
—We have a Booklet—Send for it.*

KEYSTONE
TRADE MARK
Reg. U.S. Pat. Off.
GREASE

**Makes the most efficient mechan-
ical unit more efficient**

KEYSTONE GREASE

“The Master Lubricant”

a reputation in this and other countries. Those who have used it know that it never gums at low temperatures or after long use because it is made scientifically from pure petroleum.

For the same reason its lubricating efficiency is not impaired by heat—its density and composition are unchanging.

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Chicago
Detroit
St. Louis
Denver

Executive Office and Works

Philadelphia, Pa.

Established 1884

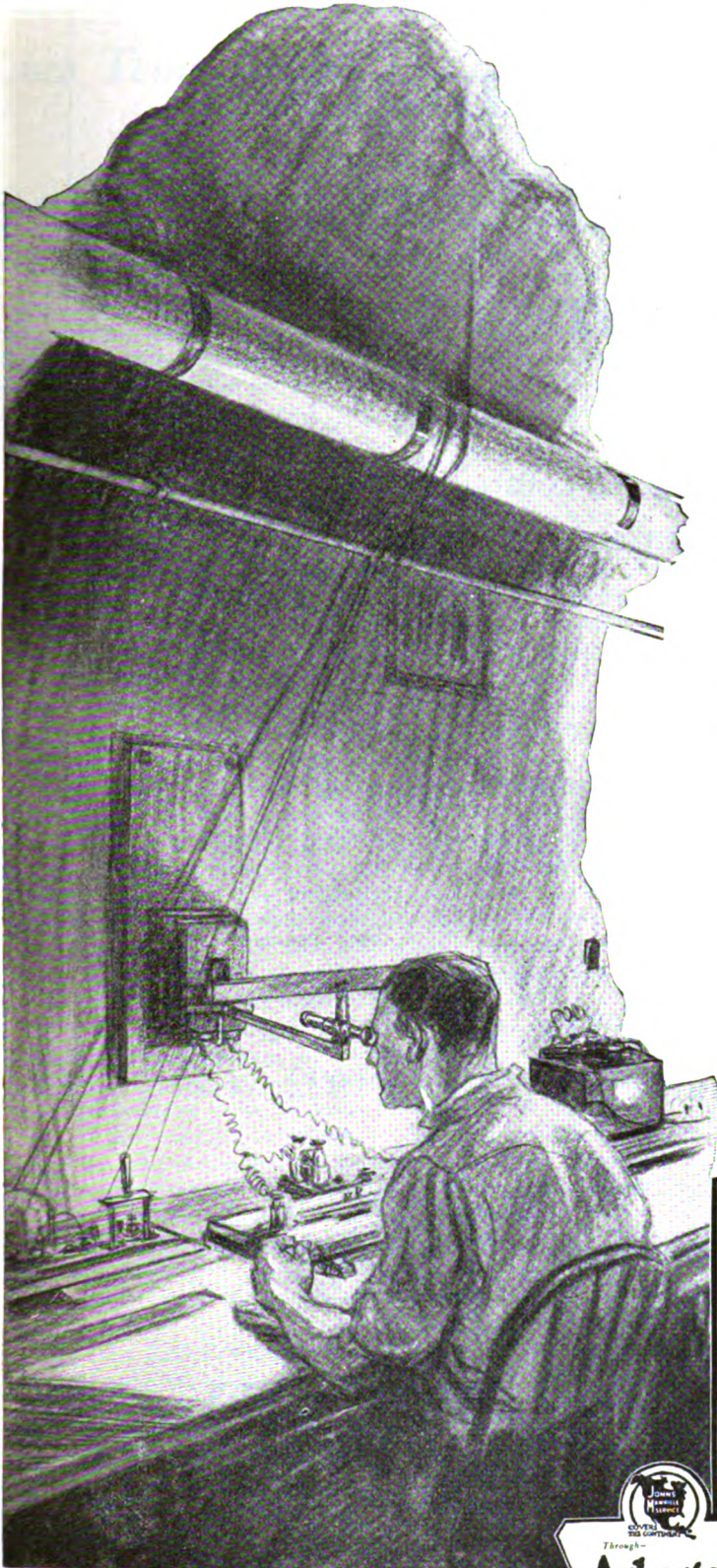
San Francisco
Minneapolis
Montgomery, W. Va.
Kansas City
Memphis
Omaha
Tulsa, Okla.

Agencies in Principal Countries Throughout the World

Co-operate:—Refer to The Blast Furnace and Steel Plant

Tested Efficiency and Tested Strength

—proof that this insulation saves more heat



A LENGTH of pipe insulation can save more heat in two ways: by its greater efficiency, and by its greater strength which increases its working life.

The greater efficiency of Asbesto-Sponge Felted Insulation has been proved by frequent tests—In a test of 26 insulations at the University of Wisconsin, it showed the highest efficiency.

The greater strength of Asbesto-Sponge is obvious—hit it with a hammer or test it in any way you please. It has lasted well over twenty years on hard service—a record that will be exceeded as the passage of time permits.

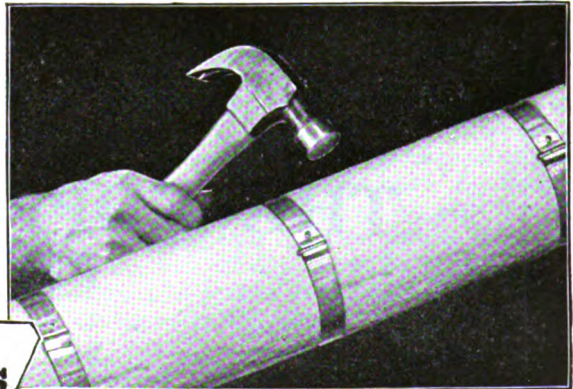
These tests prove the ability of Asbesto-Sponge Felted Insulation to save more heat in *both* of the ways such saving is possible—higher efficiency and longer life. Naturally, it is more economical.

JOHNS-MANVILLE Inc., Madison Ave. at 41st St., N. Y. City
Branches in 56 Large Cities

For Canada: CANADIAN JOHNS-MANVILLE CO., Ltd., Toronto

JOHNS-MANVILLE

Power Plant Materials



Testing pipe insulation by the electrical method—an accurate test that has repeatedly demonstrated the greater efficiency of Johns-Manville Asbesto-Sponge Felted Insulation. The electrical heating input necessary to keep the pipe at a given temperature measures the heat loss.



You can hit Asbesto-Sponge Felted Insulation with a hammer—a test that has an important bearing on the life of an insulation in service.

Co-operate:—Refer to The Blast Furnace and Steel Plant

Koppers Combination Coke and Gas Ovens

In determining the type of by-product coke oven to be built, the iron and steel company has to consider not only present requirements of coke and gas, but possible future requirements—especially the amount of gas that will be required.

Koppers Combination oven—which can be heated with coke oven gas, producer gas, blast furnace gas or blue water gas is designed to take care of this contingency.

The United States Steel Corporation is now installing Koppers Combination ovens at its Clairton plant and all ovens contracted for during 1922 were of this type.

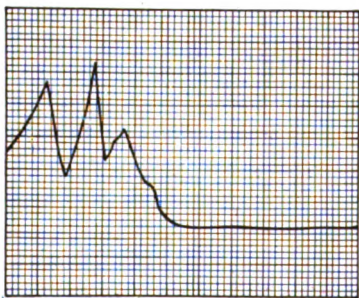
Can any iron and steel company afford to build ovens which do not have this advantage?

**THE KOPPERS COMPANY
PITTSBURGH**

Co-operate:—Refer to The Blast Furnace and Steel Plant



Lowering and Stabilizing
the Cost Curve



This is No. 9 of 10 Dominant Factors in
Lowering and Stabilizing the Cost Curve:
—We have a Booklet—Send for it.

KEYSTONE
GREASE
The Master Lubricant
TRADE MARK REG. U. S. PAT. OFF.

9. Keystone Grease is Unchanged by Age

We have on record from one of our customers a letter which says they used Keystone Grease from a single barrel for over twenty-eight years and it proved in every respect during all this time a most excellent lubricant—they used no other grease in the meantime. Twenty-eight years old and as good as ever is the record of

KEYSTONE GREASE

Makes the most efficient mechanical unit more efficient

and obviously it must have been pretty good grease at the start. Incidentally the same record speaks well for the economy of its use. The absence of all animal and vegetable matter from Keystone Grease is one of the big reasons why its effectiveness is unchanged by age.

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Chicago
Detroit
St. Louis
Denver

Executive Office and Works

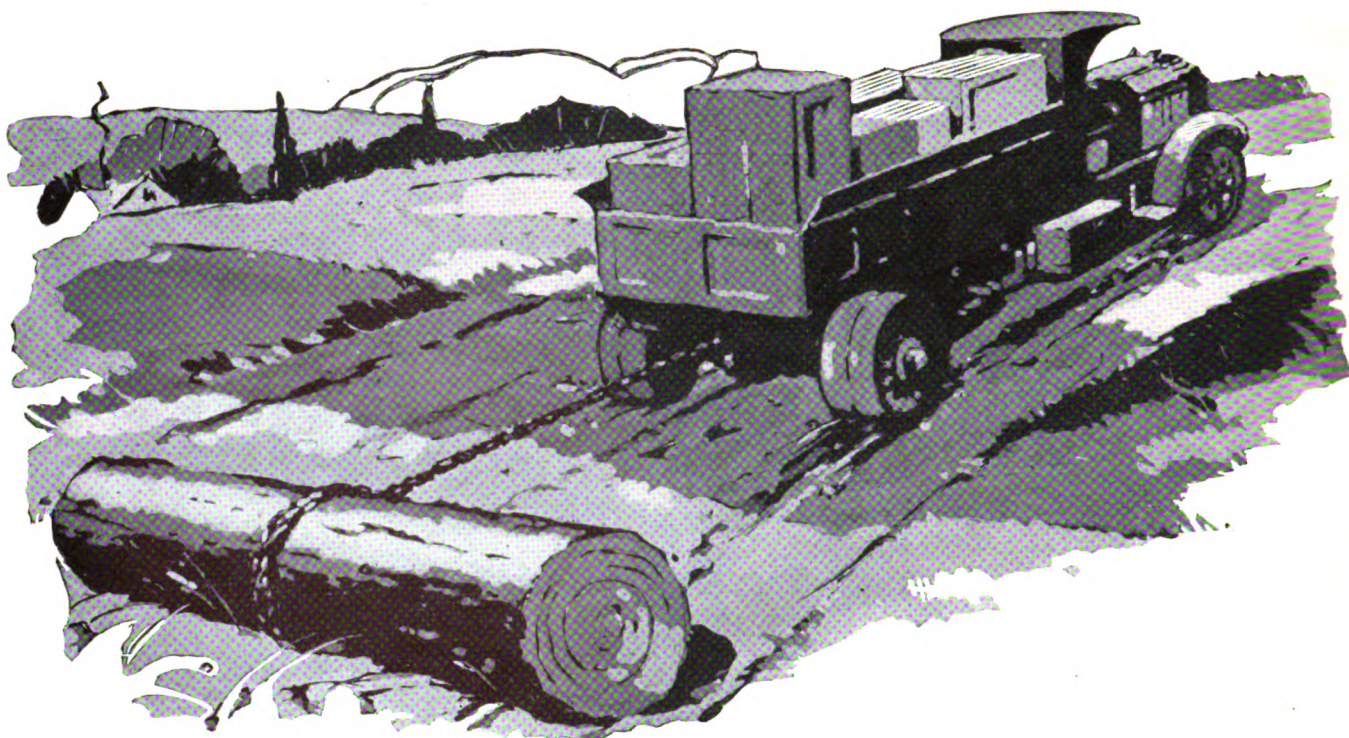
Philadelphia, Pa.

Established 1884

San Francisco
Minneapolis
Montgomery, W. Va.
Kansas City
Memphis
Omaha
Tulsa, Okla.

Agencies in Principal Countries Throughout the World

Co-operate:—Refer to The Blast Furnace and Steel Plant



No one would chain a drag on their delivery trucks

THEN why permit your plant to struggle along under an increased friction load?

Excessive friction is the "drag" on production in every industry.

In every-day service in the largest industrial plants in the world Keystone Grease and Keystone Systems of Lubrication are reducing the weight of the inevitable "drag."

No matter what the conditions or requirements in your plant are, Keystone scientific lubrication will prove more efficient and economical. It will not only increase production but will reduce operating costs and save valuable machinery from the scrap-heap.

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Chicago
Detroit
Omaha
St. Louis

Executive Office and Works:
Philadelphia, Pa.

Established 1884

Denver
San Francisco
Minneapolis
Montgomery, W. Va.
Kansas City
Memphis
Tulsa, Okla.

Agencies in Principal Countries Throughout the World

DIFFERENT plants, operating under different conditions with different types of machinery, require different methods and forms of lubrication. All the knowledge of scientific plant-operation gathered by our lubrication engineers is at your disposal—a survey of the conditions in your plant and our recommendations will cost you nothing.

KEYSTONE
GREASE
The Master Lubricant
TRADE MARK REG. U.S. PAT. OFF.

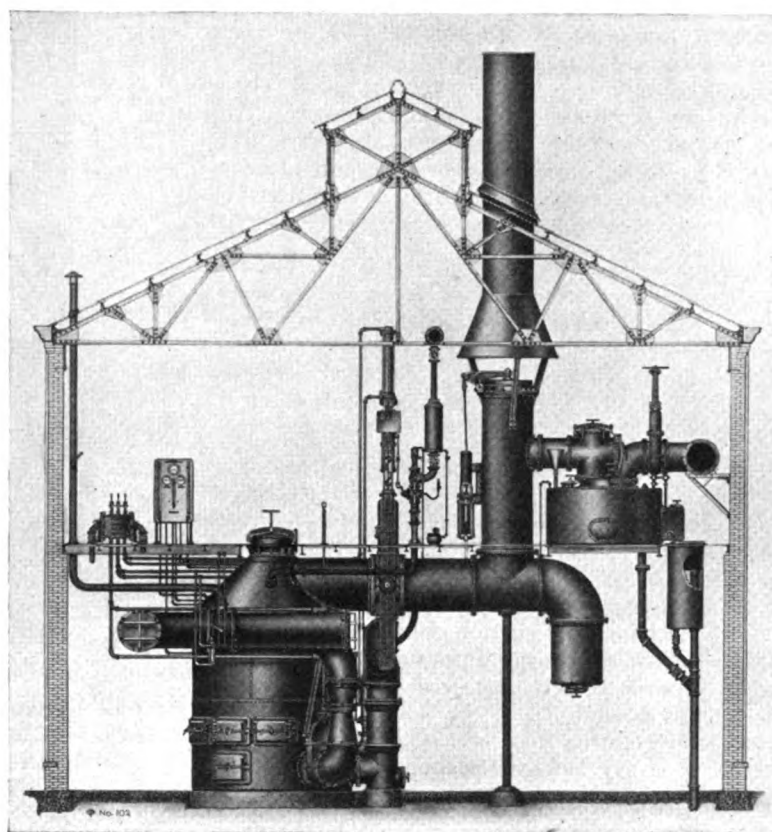
Co-operate:—Refer to The Blast Furnace and Steel Plant

Blue Gas Engineering—

¶The vital importance of careful engineering in the design and construction of blue gas apparatus is very apparent to the discriminating investigator.

¶This type of apparatus cannot be "thrown together." It must be designed and built with regard to proper materials properly bestowed.

¶It must afford ease and economy of operation, adaptability to changed conditions and rugged resistance to wear and tear.



U. G. I. BLUE GAS APPARATUS is the original.

Its experimental stages were passed years ago. It produces a **CLEAN, COOL GAS**, having high flame temperature and does it cheaply and efficiently.

U. G. I. BLUE GAS is a substitute for natural gas.

We would be glad to show facts and figures.

THE U. G. I. CONTRACTING CO.

Broad and Arch Sts., Philadelphia

335 Peoples Gas Bldg., Chicago

928 Union Arcade, Pittsburgh

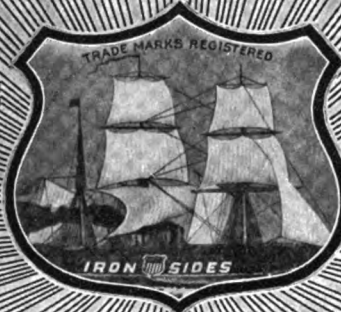


Co-operate:—Refer to The Blast Furnace and Steel Plant

THE IRONSIDES COMPANY

COLUMBUS OHIO

**Ironsides
Gear
Shield**



**Ironsides
Wire Rope
Shield**

Ironsides Automobile Gear Shield

Ironsides Scientific Lubrication insures superior lubrication and preservation of wire ropes, gears, roll necks and all bearing surfaces—thus eliminating frequent costly replacals.

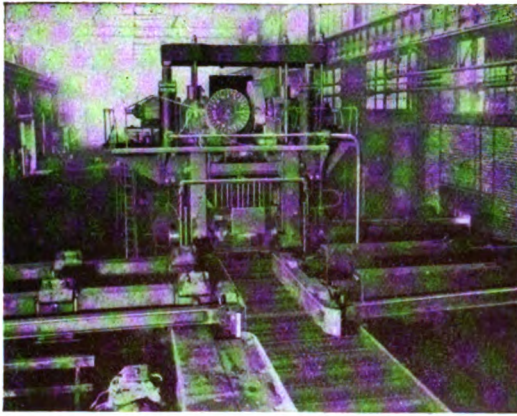
Ironsides Wire Rope Shield—a lubricant and preservative—for mines, blast furnaces, steel plants and all moving ropes.

Ironsides Gear Shield—protectively lubricates gear teeth—lessens noise—eliminates wear.

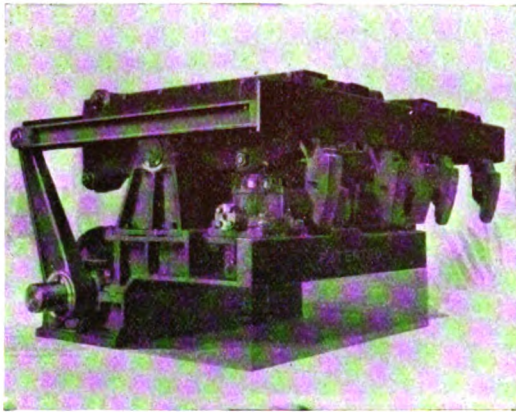
Ironsides Cold Neck Shield—protectively lubricates roll necks and bearings under most exacting conditions of speed and duty, eliminating costly replacals.

Ironsides Cold Neck Shield

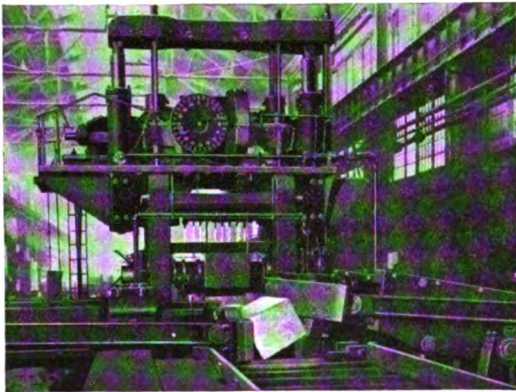
Co-operate:—Refer to The Blast Furnace and Steel Plant



Showing Manipulator Ready for Ingot



Showing Side Guard and Fingers of Tilting Unit



Showing the Turning of Ingot by Tilting Unit

Modernize Your Blooming Mill

WITH THE M. H. Co. (Patent) MANIPULATOR

WHAT IT IS

A combination Side Guard and Finger Manipulator, which has no parts under the Mill Table, but is entirely independent of the Table. It is away from scale and most accessible for Crane Service.

WHAT IT WILL DO FOR YOU

Fill a long felt need for a rapid and positive MANIPULATOR which will—SAVE TIME, ELIMINATE BREAKDOWNS, INCREASE TONNAGE and assure UNIFORMITY of output, and product. Also reducing to a minimum the wear and tear of Mill Tables.

APPLICATION

It can be readily applied to any Mill Table now in use or any new Table of the future. The great SAVING in cost of operation, upkeep and increased tonnage pays for its installation within a short time.

Ask our engineers to call and demonstrate a model of this wonderful machine.

MACKINTOSH-HEMPHILL COMPANY

PITTSBURGH, PENNSYLVANIA

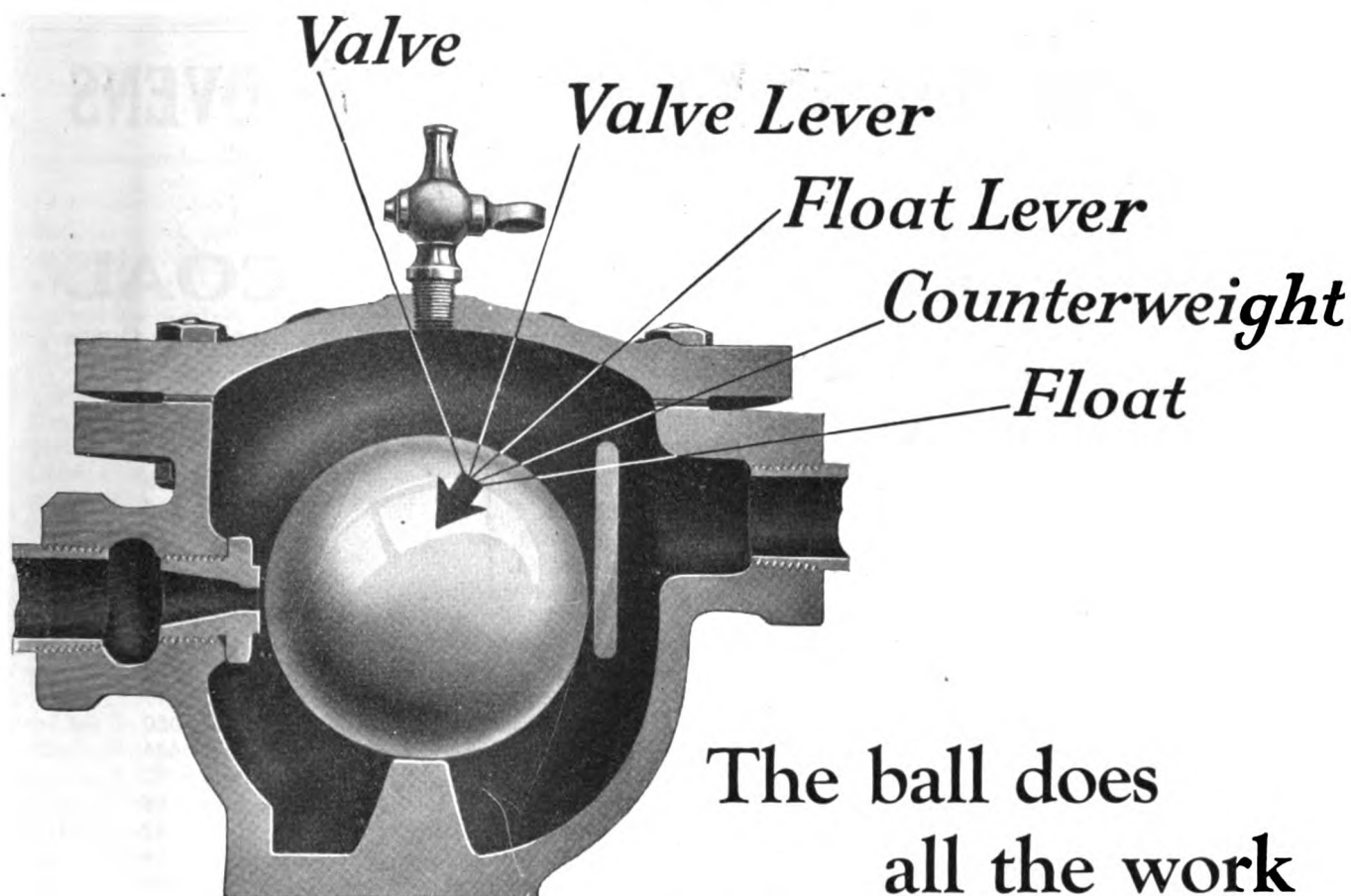
"The Best in Rolling Mill Machinery"

FORT PITT FOUNDRY
A. GARRISON FOUNDRY



WOODARD MACHINE CO.
PITTSBURGH IRON & STEEL FOUNDRY

Co-operate:—Refer to The Blast Furnace and Steel Plant



IT would be impossible to make an efficient steam trap with fewer parts than those used in the Johns-Manville Trap. There are only three parts—the rolling ball, the discharge bushing and the body—the ball is the *only* moving part.

THIS is a cross section of the Johns-Manville Steam Trap. All the usual complexity of steam trap mechanism is simplified into just one moving part—a hollow copper ball.

It is so simple that it cannot get out of order, which gives it a reliability that is making thousands of satisfied users come back for more. It is a trap that you can install and forget—for it needs only the occasional inspection that any good piece of machinery deserves.

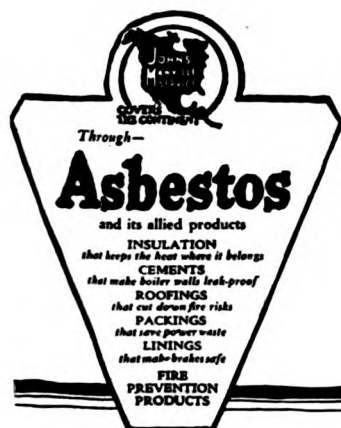
The Johns-Manville Steam Trap starts cold, discharges both water *and* air, and absolutely prevents steam leakage.

The trap is light and small, yet with no sacrifice of capacity. There are no adjustments. Its cost is low.

Investigate the Johns-Manville Steam Trap in the engineering way—test one.

JOHNS-MANVILLE Inc., Madison Ave. at 41st St., New York City
Branches in 56 Large Cities

FOR CANADA: CANADIAN JOHNS-MANVILLE CO., LTD., TORONTO



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Power Plant Materials

Co-operate:—Refer to The Blast Furnace and Steel Plant

7384 KOPPERS BY-PRODUCT COKE OVENS

IN OPERATION OR UNDER CONSTRUCTION IN THE
UNITED STATES AND CANADA HAVE AN AGGREGATE
ANNUAL CARBONIZING CAPACITY OF MORE THAN

48,000,000 NET TONS OF COAL

Plants in Operation	Location	Number of Ovens
United States Steel Corporation		
Illinois Steel Company	Joliet, Ill.	280
Illinois Steel Company	Gary, Ind.	700
Tennessee Coal, Iron & R. R. Company	Fairfield, Ala.	434
Minnesota Steel Company	Duluth, Minn.	90
Carnegie Steel Company	Clairton, Pa.	768
American Steel & Wire Company	Cleveland, O.	180
National Tube Company	Lorain, O.	208
Woodward Iron Company	Woodward, Ala.	170
Coal Products Mfg. Company	Joliet, Ill.	35
Algoma Steel Corporation, Ltd.	Sault Ste. Marie, Ont.	110
Inland Steel Company	Indiana Harbor, Ind.	130
Republic Iron & Steel Company	Youngstown, O.	143
Bethlehem Steel Company	Sparrows Point, Md.	360
Bethlehem Steel Company	South Bethlehem, Pa.	424
Bethlehem Steel Company	Steelton, Pa.	60
Laclede Gas Light Company	St. Louis, Mo.	56
Cambria Steel Company	Johnstown, Pa.	92
Toledo Furnace Company	Toledo, O.	94
Youngstown Sheet & Tube Company	Youngstown, O.	306
LaBelle Iron Works	Follansbee, W. Va.	94
United Furnace Company	Canton, O.	47
McKinney Steel Company	Cleveland, O.	204
Brier Hill Steel Company	Youngstown, O.	84
Gulf States Steel Company	Gadsden, Ala.	37
Seaboard By-Product Coke Company	Jersey City, N. J.	165
Minnesota By-Product Coke Company	St. Paul, Minn.	65
Colorado Fuel & Iron Company	Pueblo, Colo.	120
Indiana Coke & Gas Company	Terre Haute, Ind.	30
Dominion Iron & Steel Company, Ltd.	Sydney, H. S.	180
Providence Gas Company	Providence, R. I.	40
Jones & Laughlin Steel Company	Pittsburgh, Pa.	300
Rainey-Wood Coke Company	Swedeland, Pa.	110
Alabama By-Products Corporation	Birmingham, Ala.	75
Donner Union Coke Corporation	Buffalo, N. Y.	150
Domestic Coke Corporation	Fairmont, W. Va.	60
Pittsburgh Crucible Steel Company	Midland, Pa.	100
Chicago By-Product Coke Company	Chicago, Ill.	105*
Milwaukee Coke & Gas Company	Milwaukee, Wis.	100
Camden Coke Company	Camden, N. J.	37 6743
Plants Under Construction		
Carnegie Steel Company	Clairton, Pa.	366*
Weirton Steel Company	Weirton, W. Va.	37*
Battle Creek Gas Company	Battle Creek, Mich.	11*
Columbia Steel Company	Salt Lake City, Utah	33*
Republic Iron & Steel Company	Youngstown, O.	61*
Bethlehem Steel Company	Buffalo, N. Y.	114*
The Consumers Power Company	Zilwaukee, Mich.	19* 641

*Improved Type Koppers Co. Combination Oven.

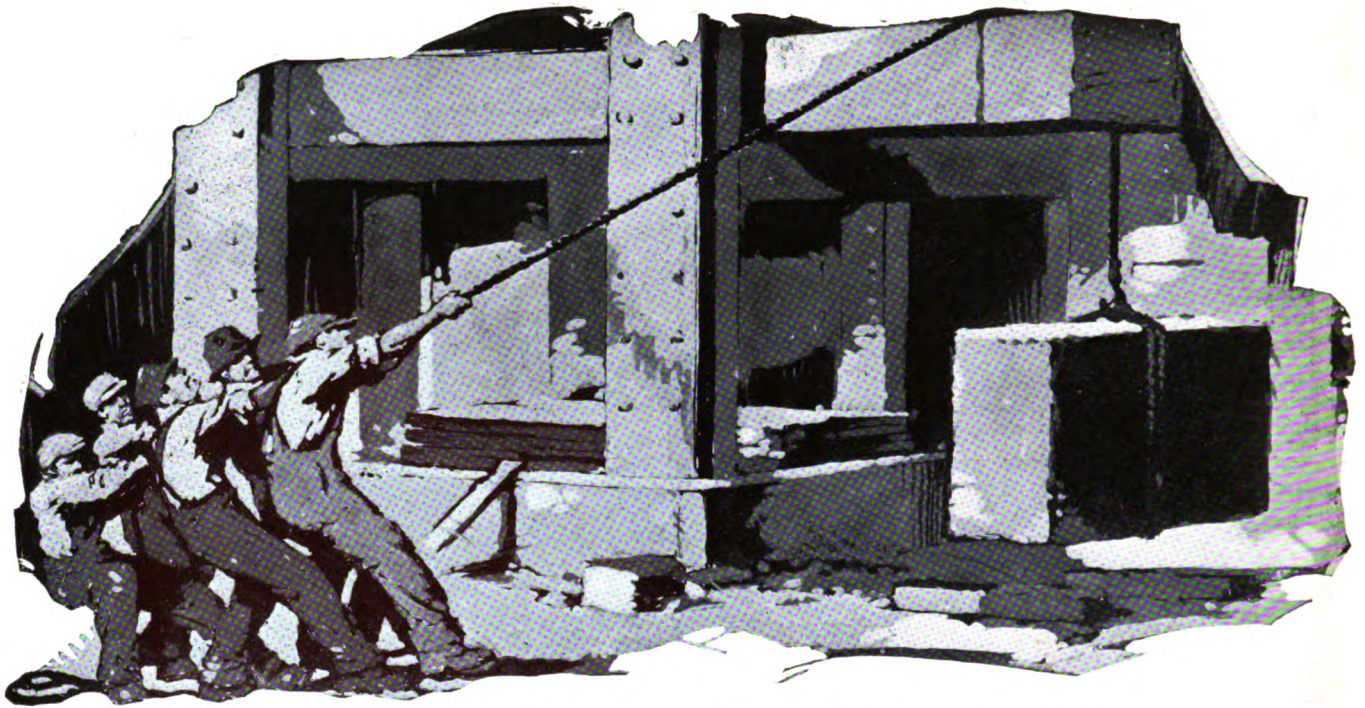
7384

THE KOPPERS COMPANY

PITTSBURGH, PA.

DESIGNERS AND BUILDERS OF BY-PRODUCT COKE AND GAS PLANTS

Co-operate:—Refer to The Blast Furnace and Steel Plant



Five men doing the work of one

WHAT a needless waste of man-power. And at any moment friction may wear the rope to the breaking point as it saws across the rough, square timber.

Inferior lubrication in plant operation means just as needless a waste of time—labor—money—power and fuel; the same wear and tear on valuable machinery, the same likelihood of a costly breakdown and the consequent production delay.

In every-day service, in thousands of plants, in every type of industry throughout the world, Keystone Grease with Keystone Systems of lubrications are reducing production costs, conserving fuel and keeping valuable machinery from the scrap-heap.

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Montgomery, W. Va.
Cincinnati
Knoxville
Memphis
New Orleans

Executive Office and Works:
Philadelphia, Pa.

Established 1884

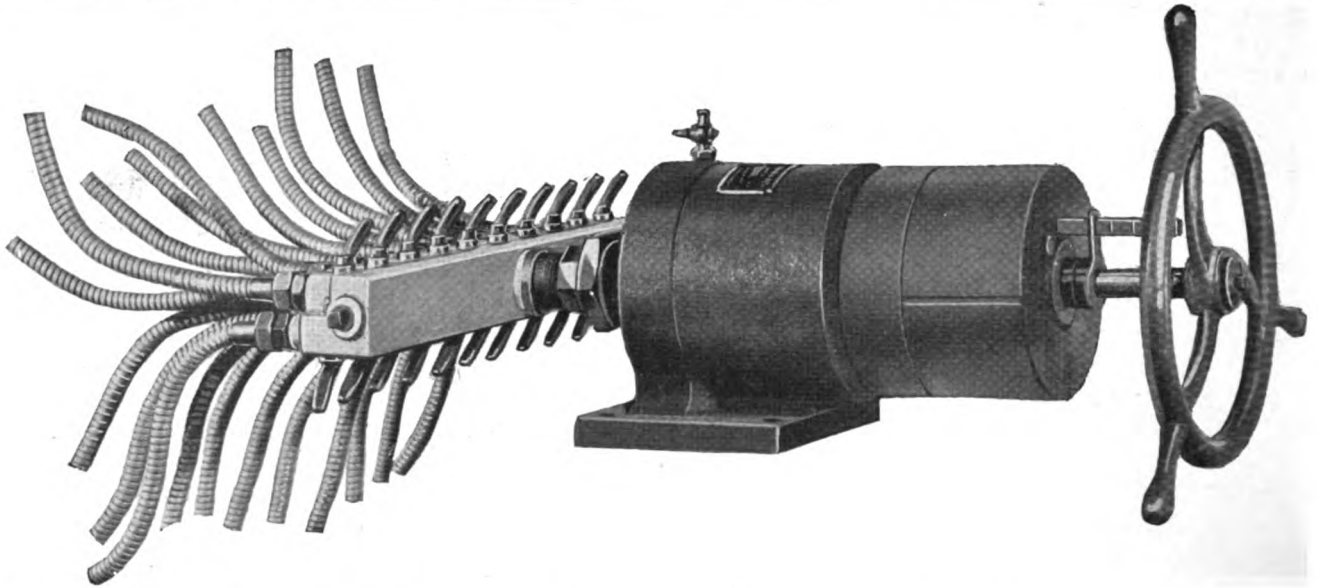
Chicago
Detroit
Minneapolis
St. Louis
Kansas City
Omaha
Tulsa, Okla.
Denver
San Francisco

Agencies in Principal Countries Throughout the World

DIFFERENT plants, operating under different conditions with different types of machinery, require different methods and forms of lubrication. All the knowledge of scientific plant-operation gathered by our lubrication engineers is at your disposal—a survey of the conditions in your plant and our recommendations will cost you nothing.

KEYSTONE
GREASE
The Master Lubricant
TRADE MARK REG. U.S. PAT. OFF.

Co-operate:—Refer to The Blast Furnace and Steel Plant



No Need for Neglected Bearings Due to Inconvenience and Hazardous Conditions

THE Keystone Manifold Safety Lubricator presents a method of applying grease under high pressure with pipe-line distribution to more than one bearing. It accomplishes this result without risk to the operator or waste of grease. Bearings that are difficult of access, due to small clearances between working parts, heat and other unfavorable conditions, are made easy to reach by this medium, thus insuring the proper lubrication of bearings that otherwise might be neglected because of inconvenience and hazardous conditions.

The illustration shown above is of the Keystone Safety Lubricator with No. 8 manifold attached, also $\frac{1}{2}$ -in. metallic tubing. The lubricators are of heavy cast-iron construction and finely machined. The manifolds are connected to the lubricator by union and short nipples. They are of aluminum construction with brass valves finely fitted. Each manifold is tested against 1,500 pounds grease pressure and they are therefore leak-proof when installed in service.

	Capacity		Outlets
Lubricator	1 lb.	No. 1 Manifold	11
Lubricator	4 lb.	No. 4 "	15
Lubricator	8 lb.	No. 8 "	21

Send for booklet describing the Keystone Manifold Safety Lubricator showing typical installations.

THE KEYSTONE LUBRICATING CO.

New York
Boston
Pittsburgh
Montgomery, W. Va.
Cincinnati
Knoxville
Memphis
New Orleans

Executive Office and Works:
21st & Clearfield Streets
Philadelphia, Pa.

Established 1884

Chicago
Detroit
Minneapolis
St. Louis
Kansas City
Omaha
Tulsa, Okla.
Denver
San Francisco

Agencies in Principal Countries Throughout the World

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Co-operate:—Refer to The Blast Furnace and Steel Plant

G-R-O-W-I-N-G

The most convincing argument that can be presented in favor of the Improved Type Koppers Combination Oven is the constantly growing list of companies which have adopted it.

There are now built or building 730 ovens of the improved type located as follows:

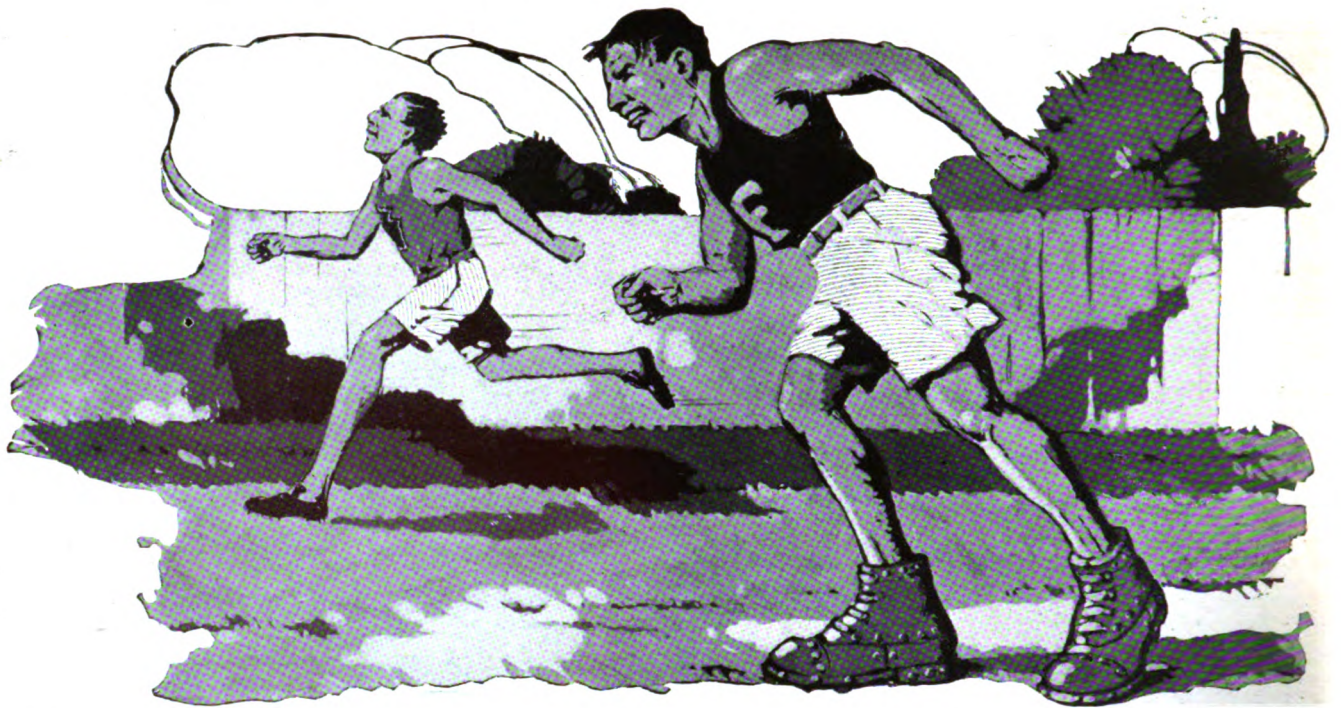
Chicago By-Products Coke Co. CHICAGO, ILL.	5
Carnegie Steel Co. CLAIRTON, PA.	366
Weirton Steel Co. WEIRTON, W. VA.	37
Republic Iron & Steel Co. YOUNGSTOWN, OHIO	61
Battle Creek Gas Co. BATTLE CREEK, MICH.	11
Columbia Steel Company SALT LAKE CITY, UTAH	33
Bethlehem Steel Co., Lackawanna Plant BUFFALO, N. Y.	114
Consumers Power Company ZILWAUKEE, MICH.	19
Trumbull Cliffs Furnace Co. WARREN, OHIO	47
Diamond Alkali Co. ALKALI, OHIO	37
Total	730

Total Number of Koppers Ovens in Operation
or Under Construction in the United
States and Canada
7468

THE KOPPERS CO., PITTSBURGH, PA.

KOPPERS

Co-operate:—Refer to The Blast Furnace and Steel Plant



No one would enter a race wearing fifty pound shoes—

THE results that come from operating a plant under present-day competitive conditions, handicapped with inferior lubrication, are the same as entering a runner in a race with fifty-pound shoes on his feet.

Friction adds to the cost of operation—to lower and stabilize production costs you must reduce friction.

Is there an excessive friction load on the power developed in your plant?

In every-day service, in thousands of plants, in every industry throughout the world, it has been proven that Keystone Grease, with the Keystone Systems of Lubrication, invariably reduces production costs, conserves the coal supply and keeps valuable machinery from the scrap-heap.

THE KEYSTONE LUBRICATING CO.

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Established 1884

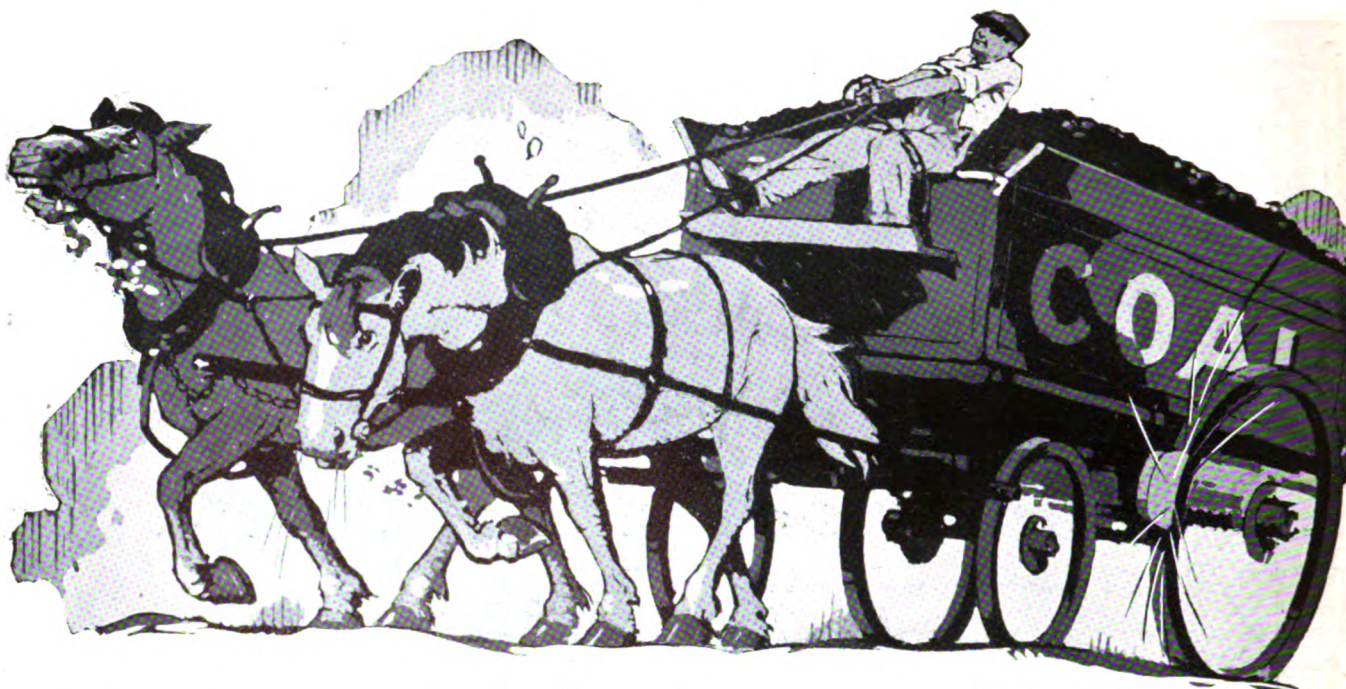
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Agencies in Principal Countries Throughout the World

DIFFERENT plants, operating under different conditions with different types of machinery, require different methods and forms of lubrication. All the knowledge of scientific plant-operation gathered by our lubrication engineers is at your disposal—a survey of the conditions in your plant and our recommendations will cost you nothing.

KEYSTONE
GREASE
The Master Lubricant
TRADE MARK REG. U.S. PAT. OFF.

Co-operate:—Refer to The Blast Furnace and Steel Plant



Driving a team all day with the brakes on

WHAT would this mean? Not only an extravagant waste of horse-power, but an early trip to the bone-yard.

In many industrial plants today, friction, due to inferior lubrication, is causing the same needless waste of horse-power. Operating costs are high, production is severely handicapped, and valuable machinery is finding its way to the scrap heap.

Wherever the importance of proper lubrication is taken into consideration, Keystone Grease has always ably demonstrated its greater efficiency by day-in-day-out service. Its superior lubrication qualities have long been recognized throughout the entire industrial world.

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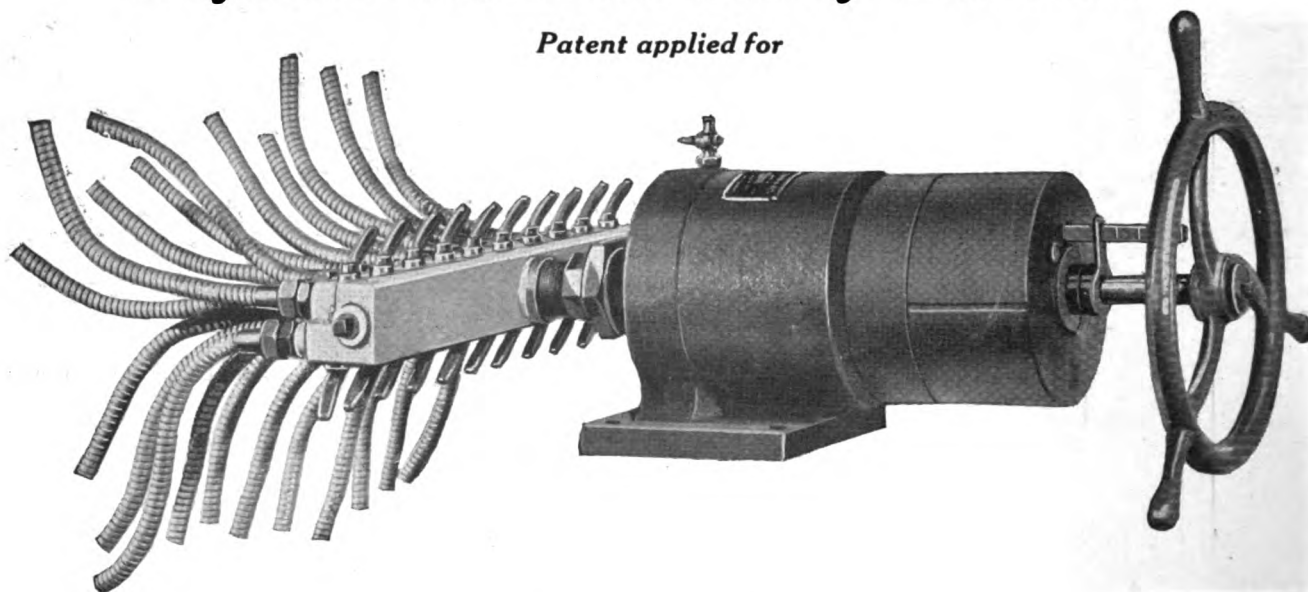
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Co-operate:—Refer to The Blast Furnace and Steel Plant

Keystone Manifold Safety Lubricator

Patent applied for



Eliminates Risk and Waste

THE Keystone Manifold Safety Lubricator presents a method of applying grease under high pressure with pipe-line distribution to more than one bearing. It accomplishes this result without risk to the operator or waste of grease. Bearings that are difficult of access, due to small clearances between working parts, heat and other unfavorable conditions, are made easy to reach by this medium, thus insuring the proper lubrication of bearings that otherwise might be neglected because of inconvenience and hazardous conditions.

The illustration shown above is of the Keystone Safety Lubricator with No. 8 manifold attached, also 1/2-in. metallic tubing. The lubricators are of heavy cast-iron construction and finely machined. The manifolds are connected to the lubricator by union and short nipples. They are of aluminum construction with brass valves finely fitted.

	Capacity		Outlets
Lubricator	1 lb.	No. 1 Manifold	11
Lubricator	4 lb.	No. 4 "	15
Lubricator	8 lb.	No. 8 "	21

Send for booklet describing the Keystone Manifold Safety Lubricator showing typical installations.

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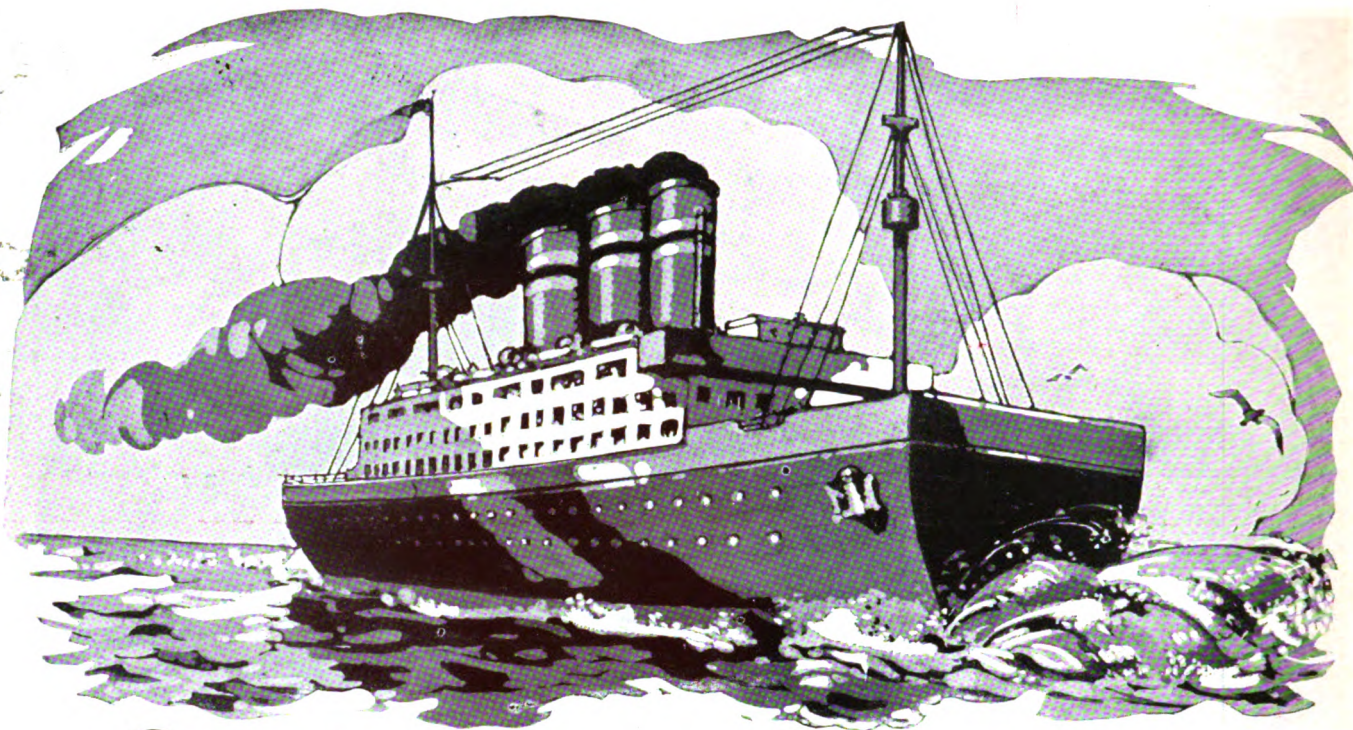
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TRADE MARK REG. U.S. PAT. OFF.

Co-operate:—Refer to The Blast Furnace and Steel Plant



You'll never see a ship like this

A SHIP like the one illustrated above is, of course, impractical. Because of the resistance of wind and water, tons of fuel would be consumed in developing wasted power and the ship's progress would be cut down to a minimum.

In present-day industry, where friction is not reduced to the last possible degree, time—labor—money—power and fuel are needlessly wasted.

Keystone Grease with Keystone Systems of Lubrication, like the bow of the modern vessel, cuts down the friction load in every industry on every type of machinery. It not only adds materially to plant efficiency but reduces production costs and saves valuable machinery.

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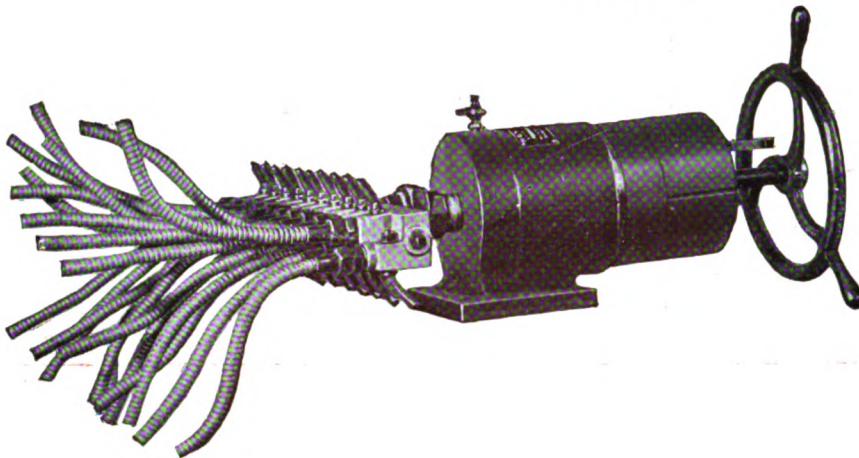
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Co-operate:—Refer to The Blast Furnace and Steel Plant

Keystone Manifold Safety Lubricator

Patent applied for



Has already proven itself on more than 28 Different types of Machinery

IN the short time, less than six months, since we first introduced the Keystone Manifold Safety Lubricator its efficiency has been tried and proven on more than 28 different types of machinery.

The Keystone Manifold Safety Lubricator presents a method of applying grease under high pressure with pipe-line distribution to more than one bearing. It accomplishes this result without risk to the operator or waste of grease. Bearings that are difficult of access, due to small clearances between working parts, heat and other unfavorable conditions, are made easy to reach by this medium, thus insuring the proper lubrication of bearings that otherwise might be neglected because of inconvenience and hazardous conditions.

Made in Three Sizes

Capacity	Outlets
Lubricator 1 lb.	No. 1 Manifold 11
Lubricator 4 lb.	No. 4 Manifold 15
Lubricator 8 lb.	No. 8 Manifold 21

Send for booklet describing the Keystone Manifold Safety Lubricator showing typical installations

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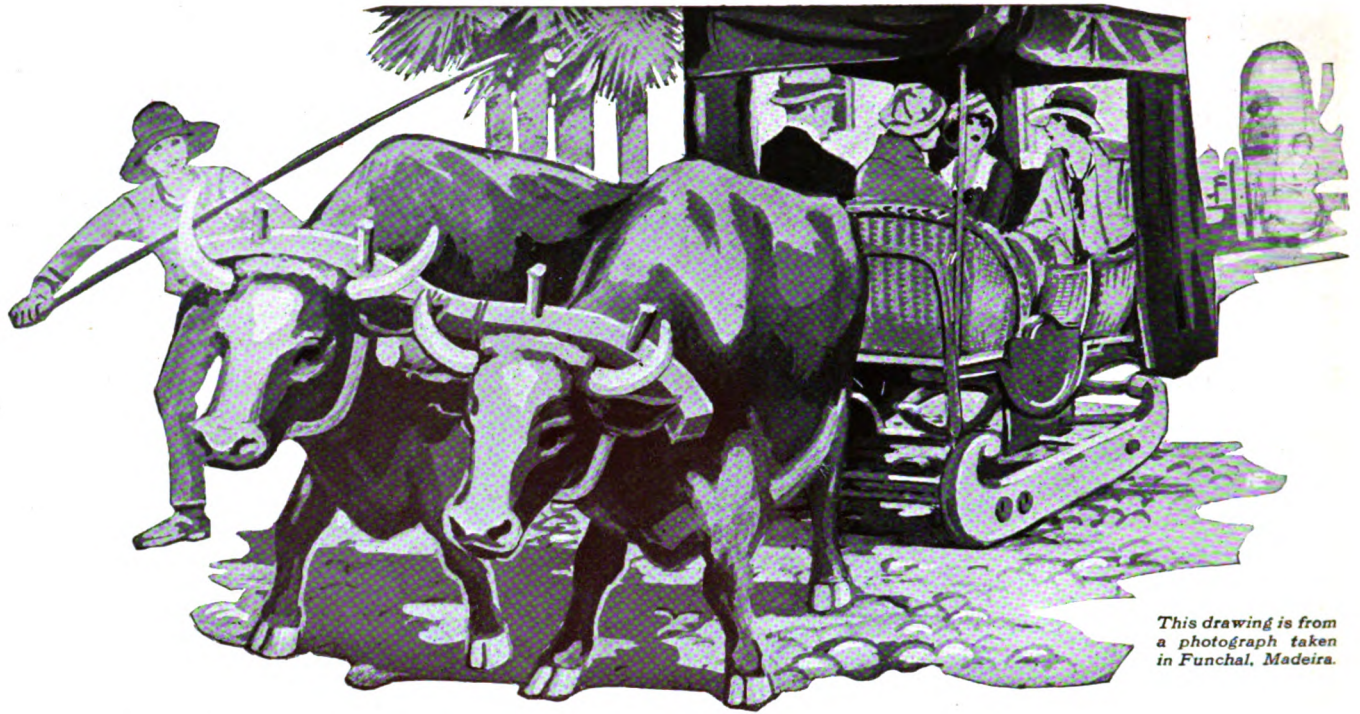
Various Types of Machinery to which the Keystone Manifold Safety Lubricator has been successfully applied.

Cement Mill Cooler Bearings
Sheet Leveler
Mosses Grinder Rolls
Calenders—Paper
Calenders—Rubber
Cranes
Butterworth Driers
Rubber Mixer (Banbury)
Shaker Conveyor Screen
Paper Slitter
Drier Roll (Steam Glands)
Stuff Pump (Paper)
Strip Mills
Mine Locomotives
Boring Mills
Rotary Kiln (Metal Heat Treating)
Water Turbine
Tube Straightener
Shears
Scarfers
Charcoal Elevator
Polishing Machine (Glass)
Jaw Crusher
Hopper Grinder
Hot Necks of Sheet Mill
Ball Mills
Cabinet Planer
Fire Engine Pump

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Co-operate:—Refer to The Blast Furnace and Steel Plant



This drawing is from a photograph taken in Funchal, Madeira.

Dashing Through Funchal in a Two-Ox Open Sleigh—

THINK how friction must wear the runners, burden the oxen with unnecessary resistance and retard the sled's progress.

In many industrial plants, such a burdening of motive power with unnecessary resistance and friction due to inefficient lubrication is taking a costly toll. The result is all too frequent break-downs, waste of power, time, labor and money.

In every-day service in thousands of plants, in every type of industry throughout the world, Keystone Grease and Keystone Systems of lubrication are reducing production costs, conserving fuel and keeping valuable machinery from the scrap-heap.

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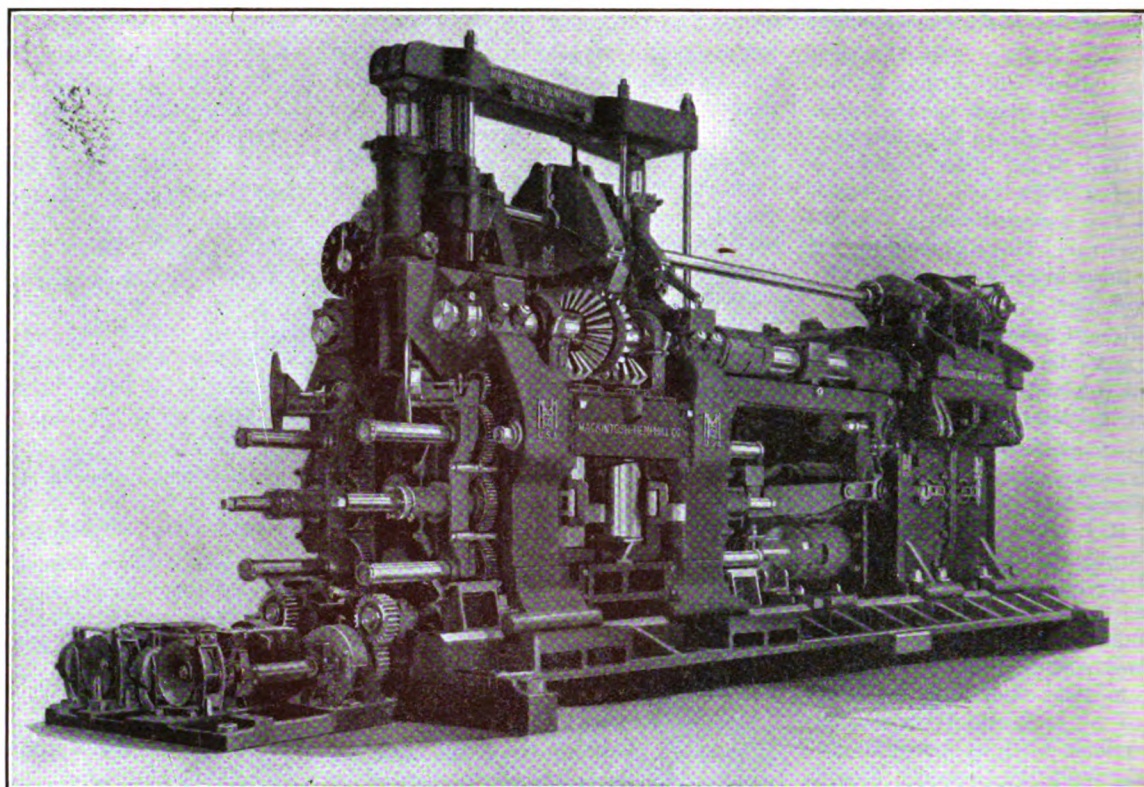
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**Practically 90% of all the Universal Mills ever constructed
in the United States have been designed and built by us**

"We built the first Universal Mill for Kloman & Co., in 1878. It was a good mill."

"We built the latest Universal Mill for Youngstown Sheet & Tube Co., this year. It is our Best Mill."

The accumulated experience gained through the construction of all these Universal Mills, over this period of years, has made possible the high state of development attained today. The record tonnages produced by the more modern mills have gained world-wide recognition.

The design of the Mackintosh-Hemphill Company's Mills is the outcome of close co-operation between our Engineering Department and the Rolling Mill Engineers and Operatives, thus embodying the most advanced ideas, both from a technical and practical standpoint.

35 Mills of this type in 45 years

EACH ONE A BETTER MILL

MACKINTOSH-HEMPHILL COMPANY

Established 1803 at

PITTSBURGH, PENNSYLVANIA

U. S. A.

"The Best in Rolling Mill Machinery"

**FORT PITT FOUNDRY
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**WOODARD MACHINE CO.
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